

WHAT IS CLAIMED IS:

1. A method for encrypting digital data for transmission over a channel, said method comprising the steps of:

- 5 delaying said digital data by at least one delay increment, to thereby generate a plurality of time-sequential signal samples; providing a set of distortion encoding keys including at least one nonlinear transfer function;
- 10 operating on each of said time-sequential signal samples by one of said keys which is a nonlinear transfer function, to thereby generate, at any instant, a plurality of distorted samples of said signal;
- 15 summing said plurality of distorted samples of said signal, to thereby generate a distortion-encrypted signal; applying said distortion-encrypted signal to an input of said channel;
- 20 extracting said distortion-encrypted signal from an output of said channel, to form an extracted distortion-encrypted signal; and decrypting said extracted distortion-encrypted signal.

2. A method according to claim 1, further including, before said step of delaying said error-correction-encoded signal by at least one delay increment, the step of forward error correction encoding said digital data.
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3. A method according to claim 1,

wherein said set of distortion encoding keys
includes at least one nonlinear transfer
function in which the coefficients of said
5 nonlinear transfer function vary with time.

4. A method according to claim 1,
wherein said set of distortion encoding keys
includes at least one nonlinear transfer
function in which the coefficients of said
5 nonlinear transfer function vary with time at a
recurrence rate corresponding to the bit rate
of said digital data.

5. A method according to claim 1,
wherein said input of said channel is at a
distance from said output of said channel, and
said channel comprises (a) a modulator coupled
5 to said input of said channel, for modulating
said distortion-encrypted signal onto at least
one carrier signal and (b) a demodulator
coupled to said output of said channel for
extracting said distortion-encrypted signal
10 from said at least one carrier signal, and said
method comprises:

performing modulation at said input
of said channel, and performing demodulation at
said output of said channel at a location
15 remote from said input.

6. A method according to claim 1,
wherein said channel includes a storage medium,
and said method further comprises the step of
interposing a delay between said step of

- 5 applying said distortion-encrypted signal to
said input of said channel and said step of
extracting said distortion-encrypted signal
from said output of said channel.

7. A method according to claim 6,
wherein said step of interposing a delay
includes the step of recording said distortion-
encrypted signal onto a magnetic disk, and
5 playing back said magnetic disk at a time later
than said recording.

8. A method according to claim 6,
wherein said step of decrypting said extracted
distortion-encrypted signal is performed by a
method comprising maximum likelihood sequence
5 estimation.

9. A method according to claim 8,
wherein said step of decrypting by a method
comprising maximum likelihood sequence
estimation includes the step of applying a
5 Viterbi algorithm.

10. A method according to claim 1,
wherein said step of providing a set of
distortion encoding keys including at least one
nonlinear transfer function includes the step
5 of providing at least one of (a) $\sin x$; (b) \cos
 x ; (c) $\exp(j\pi M(k))$; where $M(k)$ is a
conventional scrambling sequence; (d) {sum of
[$a_i x^i$]}, where the a_i are complex constants;
and (e) $\operatorname{sgn}(x)$ functions.

11. A method according to claim 1,
wherein said step of decrypting said extracted
distortion-encrypted signal comprises the step
of equalization.

12. A method according to claim 11,
wherein said equalization step comprises the
step of maximum-likelihood-sequence estimation.

13. A method according to claim 12,
wherein said step of maximum-likelihood-
sequence estimation includes the step of
matching the maximum-likelihood-sequence
estimation to those steps generating said
distortion-encrypted signal from said digital
data.

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